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Editors

Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (2nd Edition)

Proceedings of 2nd Euro-Mediterranean Conference for Environmental Integration (EMCEI-2), Tunisia 2019

Springer

Editors

See next page

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Preface

The Euro-Mediterranean and surrounding regions are currently facing accelerating environmental degradation. In the context of fast population growth, developing living standards, modernization and rapid industrialization, environmental challenges will continue and even be exacerbated in the years to come. These challenges reinforce the need to stimulate the environmental integration process by including environmental awareness, assessment, remediation and mitigation in concrete cooperative projects in the various sectors, and, most importantly, by highlighting the importance to decision-makers from the relevant sectors of integrating environmental considerations into their activities.

The integration of environmental concerns into policy decisions (i.e. environmental integration) must be intensified in order to move towards sustainable development. This is in line with the vision and plan of the European Commission for the Environment and other official organizations whose mission is to protect, preserve and improve both shores of the Euro-Mediterranean environment and their natural resources for present and future generations to ensure prosperity and social cohesion.

To stimulate the environmental integration process, it is the responsibility of scientists to consider opportunities to highlight research into potential solutions for environmental concerns and protection requirements based on innovative approaches that contribute to the preservation of a sustainable environment in the region.

In this context, the best contributions to the 2nd Euro-Mediterranean Conference on Environmental Integration (EMCEI-2019: www.emcei.net) were selected for this edited volume in order to emphasize the importance of the environmental integration process by considering the latest outcomes from interdisciplinary research (natural sciences, technology and engineering, and social sciences) with a broader focus on solution-based sustainability research, combined with a regional dimension: the Euro-Mediterranean area (which encompasses all the countries surrounding the Mediterranean) to bring recommendations and solutions for many common environmental issues, as well as mutual lessons learned.

Topics covered include approaches and methods for environmentally sustainable innovation; environmental risk assessment; bioremediation; eco-toxicology; water quality management; management of natural resources, including water resources

and georesources; renewable energy; waste valorization and management; sustainable marine and coastal area management; geo- and natural hazards such as earthquakes, landslides and others; geotechnical and geo-environmental engineering; remote sensing and GIS for geo-environmental investigations; the impact of natural and social environments on human health; among others.

In addition to the aforementioned, this environmental integration process in the Euro-Mediterranean region can only achieve its goals through the stimulation of initiatives that reduce the development gap between the two shores of the Mediterranean and that create new and closer political, economic, social, cultural and, in particular, scientific ties, founded on shared concerns which develop and integrate environmental research in the region.

In this context, Springer and the Editorial office of the *Euro-Mediterranean Journal for Environmental Integration* organized the second edition of EMCEI which was held in Sousse, Tunisia in October 2019 following the 1st EMCEI launched in 2017. In response to the conference's call for papers, more than 600 papers were submitted by authors from 58 different countries, demonstrating the global relevance of EMCEI. Following peer review, 373 papers from the geo- and bio-environmental sciences and engineering were ultimately accepted, thus making an essential contribution to the science and knowledge bases to promote a more sustainable environment for the Euro-Mediterranean region.

The short papers gathered in this volume offer an overview of current research on emerging and ongoing environmental issues and challenges and of how it applies to problems specific to the Euro-Mediterranean region and to surrounding regions so that a broader perspective on related and similar environmental challenges may be gained. Papers are categorized into thirteen broad sections to reflect the main topics addressed at the conference, namely:

1. Engineering applications for environmental management;
2. Process control, simulations and intensification for environmental management;
3. Ecotoxicology, environmental safety and bioremediation;
4. Biotechnology for environmental management;
5. Climate-change-related effects on the environment and ecological systems;
6. Natural resources, agriculture and the environment;
7. Smart technologies for environmentally friendly energy production;
8. Remote sensing and GIS for environmental monitoring and management;
9. Environmental impacts of natural hazards and environmental risk assessment;
10. Sustainable management of marine and coastal environments;
11. Sustainable management of the urban environment;
12. Sustainable management of the indoor and built environment;
13. Environmental-change-related impacts on human health.

Presenting a broad range of topics and results, the 2nd EMCEI offered a valuable opportunity for researchers and students to learn more about recent advances in environmental research initiatives in view of the accelerating environmental degradation of the Euro-Mediterranean region, which has made environmental and

resource protection a dominant priority for sustainable development and societal welfare. We hope scientists and policy makers will find these contributions from the 2nd EMCEI useful in the search to understand and solve some of the most pressing environmental issues for the Mediterranean region.

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December 2019	

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About the 2nd Springer Conference of the *Euro-Mediterranean Journal for Environmental Integration* (EMCEI-2), Tunisia 2019

Currently, the Euro-Mediterranean region is facing not only significant political, economical and social challenges, but also an ever-growing environmental degradation that has made environmental and resource protection an increasingly critical issue. These issues have re-energized the debate on the Euro-Mediterranean integration process through concrete cooperative projects in many sectors, especially those concerned with environmental awareness, assessment and improvement. This integration process is intended to reduce the development gap between the northern and southern coasts of the Mediterranean and to create new and closer political, economical, social, cultural and, most importantly, scientific ties between these two shores founded on common concerns.

In this context, and with the specific aim to promote Euro-Mediterranean scientific partnership so as to develop and integrate environmental research and findings into the activities of related sectors in the region, a group of Euro-Mediterranean scientists have recently launched the *Euro-Mediterranean Journal for Environmental Integration.* This Springer journal, which started in 2016, has been now indexed in the Web of Science (ISI's ESCI database). It offers a scientific platform for presenting and discussing the latest advances in research with a focus on emerging environmental issues and challenges in the region. In particular, this first regional journal from the Euro-Mediterranean, encompassing all disciplines of the earth and environmental

sciences, seeks to make societies and decision-makers from related sectors aware of the importance of integrating environmental considerations into their respective activities. In this context, the journal provides a scientific forum that promotes the exchange of knowledge and fosters collaborations to improve the consistency of environmental management efforts between the countries of the northern and southern shores of the Mediterranean.

To further strengthen Euro-Mediterranean environmental integration, the Editors of the *Euro-Mediterranean Journal for Environmental Integration* organize this year, in close collaboration with Springer, the 2nd Euro-Mediterranean Conference for Environmental Integration (EMCEI-2). The conference aims to gather new research contributions from all disciplines of earth and environmental sciences by Euro-Mediterranean scientists from diverse backgrounds, and thus makes an essential contribution towards ensuring that science and knowledge contribute to the promotion of a more sustainable environment for the Euro-Mediterranean region.

The scientific committee of the 2nd EMCEI invites research papers on all cross-cutting themes of the environmental sciences and engineering, with a main focus on the following thirteen conference tracks:

- Track 1. Engineering applications for environmental management
- Track 2. Process control, simulations and intensification for environmental management
- Track 3. Ecotoxicology, environmental safety and bioremediation
- Track 4. Biotechnology for environmental management
- Track 5. Climate-change-related effects on the environment and ecological systems
- Track 6. Natural resources, agriculture and the environment
- Track 7. Smart technologies for environmentally friendly energy production
- Track 8. Remote sensing and GIS for environmental monitoring and management
- Track 9. Environmental impacts of natural hazards and environmental risk assessment
- Track 10. Sustainable management of marine and coastal environments
- Track 11. Sustainable management of the urban environment
- Track 12. Sustainable management of the indoor and built environment
- Track 13. Environmental-change-related impacts on human health.

The dynamic four-day conference provided more than 400 attendees with opportunities to share their latest unpublished findings and learn the newest environment

studies. The event also allowed attendees to meet and discuss with the journal's editors and reviewers.

More than 600 short contributing papers to the conference were submitted by authors from more than 70 countries. After a pre-conference peer-review process by more than 500 reviewers, 373 papers were accepted. These papers were published as chapters in the conference proceedings by Springer.

The conference proceedings consist of thirteen sections, each edited by the following group of *Euro-Mediterranean Journal for Environmental Integration* (EMJEI) editors and other guest editors:

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Achraf Ghorbal: Institut Supérieur des Sciences Appliquées et de Technologie de Gabès, Tunisia
Mohamed Ksibi: High Institute of Biotechnology, University of Sfax, Tunisia
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Sami Rtimi: Swiss Federal Institute of Technology, Lausanne, Switzerland,
Vincenzo Naddeo: University of Salerno, Italy

Section 2: Process Control, Simulations and Intensification for Environmental Management

Sudip Chakraborty: Università della Calabria, Italy

Section 3: Ecotoxicology, Environmental Safety and Bioremediation

Olfa Hentati: ISBS, University of Sfax, Tunisia
Achraf Ghorbal: Institut Supérieur des Sciences Appliquées et de Technologie de Gabès, Tunisia
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Sandeep Panda: Department of Mining Engineering, Suleyman Demirel University, Isparta, Turkey

Section 4: Biotechnology for Environmental Management

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Giulia Guerriero: University of Naples, Italy

Section 5: Climate-Change-Related Effects on the Environment and Ecological Systems

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Section 6: Natural Resources, Agriculture and the Environment

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Armando da Costa Duarte: University of Aveiro, Portugal
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Section 7: Smart Technologies for Environmentally Friendly Energy Production

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Mongi Seffen: High School of Science & Technology, University of Sousse, Tunisia

Section 8: Remote Sensing and GIS for Environmental Monitoring and Management

Anthony Lehmann: Université de Genève, Switzerland
Nabil Khélifi: Springer, a part of Springer Nature, Heidelberg, Germany

Section 9: Environmental Impacts of Natural Hazards and Environmental Risk Assessment

Amjad Kallel: ENIS, University of Sfax, Tunisia
Helder I. Chaminé: School of Engineering (ISEP), Polytechnic of Porto, Portugal
Settimio Ferlisi: University of Salerno, Italy
Maurizio Barbieri: Università degli Studi di Roma La Sapienza, Italy

Section 10: Sustainable Management of Marine and Coastal Environments

João Miguel Dias: University of Aveiro, Portugal
Giulia Guerriero: University of Naples, Italy

Section 11: Sustainable Management of the Urban Environment

Benigno Sánchez Cabrero: FOTOAIR-CIEMAT, Analysis & Photocatalytic Treatment of Pollutants in Air, Madrid, Spain
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Section 12: Sustainable Management of the Indoor and Built Environment

Benigno Sánchez Cabrero: FOTOAIR-CIEMAT, Analysis & Photocatalytic Treatment of Pollutants in Air, Madrid, Spain

Section 13: Environmental-Change-Related Impacts on Human Health

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About the Editors

Mohamed Ksibi completed his Ph.D. in 1993 in Applied Chemistry at the University of Poitiers, France. He also gained the Habilitation (HDR) in Chemistry from the University of Sfax, Tunisia in 2003. He was appointed as a full Professor of Chemistry in 2009 at the Higher Institute of Biotechnology of Sfax (ISBS). His areas of research interest include removal and toxicology assessment of persistent organic pollutants in the environment (water and sediment/soil). He has supervised ten theses to completion and examined a further five Ph.Ds. He has also supervised fifteen MSc. theses. He has co-published about fifty-five papers, eight book chapters and co-edited a book (two volumes): *Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions*. He is the co-editor-in-chief of the *Euro-Mediterranean Journal of Environmental Integration* (*h-index* 24). Dr. Ksibi was the Institute's Deputy Director of the ISBS from August 2011 until December 2017; he also served as the Director of the Department of Biotechnology and Health at ISBS from May 2008 until May 2011. He has been the chairman for the 1st in 2017 and the 2nd in 2019 of the Euro-Mediterranean Conference for Environmental Integration (https://www.emcei.net).

Achraf Ghorbal is the Vice-Director of the Higher Institute of Applied Sciences and Technology of Gabes–University of Gabes–Tunisia. Dr. Ghorbal obtained his M.Sc. in Processes and Materials Engineering (2003) and a Ph.D. in Chemistry of Materials (2006) from the University of Haute Alsace–Mulhouse–France. In 2007 he joined the French Atomic Energy Commission (Commissariat à l'énergie atomique) in Saclay–France, as a post-doctoral fellow. In 2008 he was hired as Assistant Professor, and then promoted to Associate Professor in Materials Sciences in 2015 at the University of Gabes–Tunisia. His research focuses on wastewater treatment, biopolymers, eco-materials and bio-composites for environmental applications. Dr. Ghorbal has authored and co-authored over forty scientific papers (peer-reviewed papers, books, book chapters, and patents), coordinated as a principal investigator in research and educational projects financed by national or international funds (e.g. Erasmus + CBHE promoted by the European Commission Agency; Indo-Tunisian joint project), and serves as peer reviewer for several high-impact journals (e.g. *Waste Management*; *Environmental Science and Pollution Research*). His work has been internationally recognized by several prestigious distinctions such as the Springer Best Reviewer Award (2017, Euro-Mediterranean Conference for Environmental Integration). Since 2019, Dr. Ghorbal is a managing and developmental editor of the *Euro-Mediterranean Journal for Environmental Integration*—a Springer Nature journal.

Sudip Chakraborty obtained a Doctorate in Chemical Engineering from University of Calabria, Italy. He currently works at the Laboratory of Transport Phenomena and Biotechnology, University of Calabria, Italy. He has successfully gained the Abilitazione Scientifica Nazionale–full professor in sector–ING-IND 24, and is also adjunct professor at Mindanao State University, the Philippines. Dr. Chakraborty has delivered several keynote/invited lectures and presentations in many international conferences all over the world. His major fields of interest are membrane separation, plasmonic nanoparticles, composite materials, energy and process intensification.

Dr. Chakraborty with h-index-30 has published more than ninety-five research publications in international SCI-indexed journals/book chapters, as well as more than seventy-five conferences. He has edited books and book chapters apart from several special issues in SCI-indexed journals. Dr. Chakraborty has also chaired technical sessions in many International Conferences. He is a member of several professional bodies such as the European Membrane Society, the Finnish Catalysis Society and the American Oil Chemists Society. He was also a visiting researcher at Massachusetts Institute of Technology (MIT), Boston, USA and Yale University, New Haven, Connecticut. Dr. Chakraborty is an associate editor of *Groundwater for Sustainable Development* (Elsevier) as well as chief editor and journal development editor of the *Euro-Mediterranean Journal of Environmental Integration* (Springer Nature). He has also edited special issues for Springer, Elsevier and MDPI journals.

Helder I. Chaminé is a skilled geologist and Professor of Engineering Geosciences at the School of Engineering (ISEP) at the Polytechnic of Porto, Porugal. He has over thirteenth years' experience in multidisciplinary geosciences research, consultancy and practice. He studied geological engineering and geology (B.Sc., 1990) at the Universities of Aveiro and Porto (Portugal), respectively. He received his Ph.D. in geology at the University of Porto in 2000 and spent his postdoctoral research in applied geosciences at the University of Aveiro (2001–2003). In 2011 he received

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Presently, he is Head of the Laboratory of Cartography and Applied Geology (LABCARGA|ISEP), Senior Researcher at the Centre GeoBioTec|U. Aveiro and Centre IDL|U.Lisbon, and is a member of the executive board of the MSc+BSc Geotechnical and Geoenvironmental Engineering (OE+EUR-ACE Label) and the Department of Geotechnical Engineering (ISEP). Currently, he belongs to the board of the Portuguese Association of Geologists (APG), Portuguese Committee of Environmental Geotechnics from SPG, and the International Association of Hydrogeologists–Portuguese Chapter. He was a board member of the SPG - Portuguese Geotechnical Society (2016–2020) the APGeom–Portuguese Association of Geomorphologists (2009–2013). Before joining the academy, he worked for over a decade in international projects for the geo-environment, mining, geotechnics and groundwater industry and/or academia. He was a consultant and/or responsible for over seventy projects in rock engineering, applied geology, hydrogeomechanics, slope geotechnics, mining geology, exploration hydrogeology, hard-rock hydrogeology, water resources, urban groundwater and applied mapping (Mozambique, Portugal and Spain).

He has co-authored over 200 publications in indexed journals, conference proceedings/full papers, book chapters, technical and professional papers. He co-edited over 14 special volumes, as well as is presently evolved in editing themed issues for 5 international journals. He has a wide activity as a referee for several international journals. He served as invited Expert Evaluator of Bologna Geoscience programme for DGES (Portugal) and Scientific Projects Evaluation for NCST (Kazakhstan) and NRF|RISA (South Africa), as well as Coordinator of "Geology on Summer/Ciência Viva" programme at ISEP for geosciences dissemination. He has been also active with teaching and supervising of many Ph.D., M.Sc. and undergraduate students.

Helder I. Chaminé has worked on the editorial boards of the *Arabian Journal of Geosciences* (SSG+Springer), *Hydrogeology Journal* (IAH+Springer), *Geotechnical Research* (ICE), *Springer Nature Applied Sciences*

(Springer), *Mediterranean Geoscience Reviews* (Springer), Discover Water (Springer), Euro-Mediterranean Journal for Environmental Integration (Springer), *Geosciences* (MDPI), *Revista Geotecnia* (Portugal), and *Geología Aplicada a la Ingeniería y al Ambiente* (Argentina), among others. Currently, he is co-chair of the scientific committee of the 3rd International Workshop on Natural Hazards–NATHAZ'22 (Terceira Island, Azores, May 2022) with the support of the Springer.

Maurizio Barbieri holds a degree in Geological Sciences (1994) and a Ph.D. degree in Earth Sciences (1998) from Sapienza University of Rome, (Italy). He is currently Associate Professor of Environmental Geochemistry and Hydrogeochemistry at Sapienza University of Rome (Italy). His current research focuses on the application of the geochemistry methodologies in the characterization of environmental problems. In particular he has studied the distribution of elements and isotopes in the Earth systems with emphasis on the use abundances and isotopic ratios in defining the interaction between different reservoirs (mantle, crust, atmosphere and hydrosphere). He also has related interests in environmental geochemistry and health, studying the role of toxic trace elements (e.g. As, B and Hg), deriving from hydrogeochemical anomalies of natural origin, on water quality.

Maurizio Barbieri was environmental advisor (Hydrogeochemistry) for the International Project (2016–2019) SECOSUD II–Conservation and equitable use of biological diversity in the SADC region. The project was financed by the Italian Agency for Development Cooperation and implemented through Eduardo Mondlane University, South African National Park and Sapienza University of Rome.

He was scientific coordinator (2014–2016) for the geochemical model of the Vico Lake (Central Italy), with particular regard to environmental arsenic. Client: Regional Agency for Environmental Protection of Lazio.

He was scientific coordinator for the Water Unit of the International Project (2012–2014): Institutional Support to the management of Protected Areas in Albania, with funding from the International Union for the Conservation of Nature (IUCN).

Giulia Guerriero received her Ph.D. at the University of Naples Federico II, Italy, where she is currently Associate Professor of Comparative Anatomy and Cytology and Chairman of the Comparative Endocrinology Laboratory, and is on the Advisory Board for the Center for Environmental Research. She performed postdoctoral work at the Department of Pharmacology, Thomas Jefferson University. Philadelphia, PA; the Department of Ob/Gyn, University of Illinois., Chicago, IL; and the Department of Physiology, Oregon Health Sciences, University of Portland, Oregon (USA). Her research efforts have focused on the correlation between oxidants and antioxidants in physiological defenses; on the role of steroid receptors in reproduction, and on the importance of barcoding in the evaluation of species-specific molecular responses. She is currently conducting research on the reproductive health effects of climate change, environmental pollution, sustainable economies and fisheries, and resilient systems. She has served on several working groups and technical committees and, as unit coordinator, in national and international projects. She has organized and participated in international conferences. Dr. Guerriero has published in relevant refereed international journals, and is currently serving as editor of several international journals. Further, she is a reviewer of international journal conference papers, books, research theses, national and international research proposals, as well as a BIES external examiner for UNESCO. She is a member of several national and international scientific societies and of the *barcodingitaly* consortium. Since 2011 she has been a representative of bilateral agreements between Federico II University and universities and research centers in Egypt, Algeria, Morocco, Malaysia and Japan.

Olfa Hentati is an Associate Professor (2019) at the Higher Institute of Biotechnology (ISBS), University of Sfax. Since 2006 she has been a research member at the Laboratory Environemental engeneering et Ecotechnology (GEET–LR16ES19) at the National School of Engineers of Sfax (ENIS). She received her Diploma in Biology and Functional Exploration from the Faculty of Medicine at the University of Tunis, Tunisia, in 1988; her BSc and MSc in Cell Biology from the University of Poitiers, France in 1993 and 1994 respectively; and her Ph.D. in Cell Biology and Physiology from the University of Poitiers, France in 1999.

In 2017 Dr. Hentati gained *her Habilitation in* Biological Engineering. The focus of her research is on the use of terrestrial and aquatic organisms as bioindicators of chemical pollution, with particular emphasis to the influence of biological and environmental factors on the bioaccumulation of trace metals, *raw* and chemically treated dyeing wastewater, phenols and pharmaceuticals residues. She has wide experience on the ecotoxicological approach in arid to semi-arid areas, with particular emphasis to the characterization of key sentinel species to assess the early occurrence of biological disturbance of anthropogenic origin, and the toxicity and sensitivity to pollutants of arid-adapted organisms. She is associate editor on the *Euro-Mediterranean Journal for Environmental Integration*and serves as a referee in several peer-reviewed scientific journals.

Abdelazim Negm is a professor of Hydraulics and Water Resources in the Water and Water Structures Engineering Department at the Faculty of Engineering at Zagazig University. He worked as a demonstrator in the Faculty of Engineering, Zagazig University in 1986 and continued there until he occupied the position of Vice Dean for Academic and Student Affairs. He worked for the Egypt–Japan University of Science and Technology (E-JUST) as a professor of Water Resources from December 2012 until September. 2016, and was chairperson of the Environmental Engineering Department at E-JUST from March 2013 until March 2016.

Professor Negm has published more than 350 scientific papers in national and international Journals and conferences, and about fifty book chapters. He has participated in more than eighty-five conferences and was a keynote speaker at several national and international conferences. He has been awarded prizes for best papers three times. His research areas include hydraulics, hydrology and water resources. Currently, he is very interested in sustainability studies, sustainable development and the green environment in addition to water resources management.

Professor Negm is a member of IAHR and is the head of the Egyptian permanent scientific committee for Water Resources (115) for the promotion of associate and professorship positions for the cycle 2019–2022, and was the Vice Head for the cycle 2016–2019. He is a member of the editorial board of several scientific journals and international. conferences, associate editor-in-chief for IWTJ and was a member of the organizing committee of Oceanography 2015, and IWTC2013-IWTC2017. Additionally, he was Secretary General of the IWTC (www.IWTC.info) from 2013 until 2017. He was the head of the ZU committee for assessment of the scientific publications of ZU faculties until December 2018. Currently, he is organizing several contributed volumes to be published by Springer International Publishing during 2019/2020, after the successful publication of twelve contributed volumes by Springer Nature during the years 2016–2019, under the Handbook of Environmental Chemistry (HEC). Recently, four contributed volumes were published the under Springer Water series (2020). He is the editor-in-chief of *EIJEST* (Faculty of Engineering, Zagazig University), associate editor of *IWTJ* (IWTA) and *EMJEI* (Springer) and guest editor of *AJGS*–Springer. He is the principal investigator of several international projects. Currently, he is a member of the editorial board of the HEC series.

Professor Negm is listed in: Marquis' *Who's Who?* for over than ten years until now; IBC's *2000 Outstanding Intellectuals of the 21st Century*; and the ABI Directory for his achievement in the fields of hydraulics and water resources. He has been nominated for many other awards from both IBC and ABI.

Anthony Lehmann was trained as an aquatic biologist and is now associate professor at the Institute for Environmental Sciences at the University of Geneva in Switzerland. He is a pioneer in combining Geographic Information Systems (GIS) with statistical modeling in the field of species distribution modeling, and has published and made available the first package called GRASP to build spatial predictions from point observations of plant and animal distributions. More recently, he coordinated the FP7 enviroGRIDS project, in which he concentrated on the use of hydrologic modeling to fill the gaps between scientific information and decision-making in the Black Sea catchment, by building capacity on Earth Observation and data-sharing approaches in the framework of the Global Earth Observation System of Systems (GEOSS). He is the coordinator of the H2020 GEOEssential project on Essential Variables derived from earth observations. He coordinates also a Swiss national research proposal entitled SWATCH21 on "Eco-hydrologic services of Swiss rivers and catchments under climate and landuse scenarios". Since the end of the enviroGRIDS project in 2013, Anthony Lehmann is orienting his research on spatially-explicit environmental assessment such as the Ecosystem Services and Nexus approach. Together with NatCap group from Stanford University, he wrote a review paper on "Lifting the barriers of online tools to address sustainability challenges". He collaborates also with the University Autonomous of Barcelona on the use of their nexus tool for "Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism" in complex socio-ecological systems. He is associate editor on the journal *Environmental Sciences and Policy*where he is particularly editing the papers related to biodiversity and hydrologic issues with links with information technologies and modeling. He co-coordinated the edition of a MOOC on Ecosystem Services. He is repsonsible for a continuing education program on "Geomatics for a Sustainable Environment".

Jörg Römbke has a Ph.D. and a Diploma in Biology from the University of Frankfurt am Main. In 1994 he co-founded ECT Oekotoxikologie GmbH (located in Flörsheim/Germany) as a private contract research laboratory, where he is still one of two managing directors. Dr. Römbke is responsible for ecotoxicological effect and fate tests as well as the environmental risk assessment of chemicals (pesticides, heavy metals or pharmaceuticals) working both for the chemical industry and for national and international governmental authorities. He has published about 150 papers in indexed journals. Dr. Römbke specializes in the taxonomy, biogeography and ecology of soil fauna, in particular Oligochaeta such as earthworms and Enchytraeidae. He is involved in several ecological and ecotoxicological field-studies in Germany, other European countries, Brazil (Amazonas, Parana) and North Africa, most recently the EU-FP7 project EcoFINDERS. He is especially interested in the development and standardization of ecotoxicological test methods as well as in the international harmonization of methods for biological soil monitoring, for example, serving as chair of ISO TC 190/SC4 (the committee responsible for biological methods).

Armando Costa Duarte obtained a Chemical Engineering five-year degree at the University of Oporto in 1977, a Ph.D. in Public Health Engineering at the University of Newcastle-upon-Tyne in 1981, and the Habilitation in Chemistry at the University of Aveiro in 1989. He has over thirty-five years of internationally recognized experience in analytical chemistry, qualimetrics and analytical quality assurance aiming at obtaining experimental data to support decisions on food safety, health and environmental protection, as well as sustainable development.

His research has made significant contributions in the field of distribution, availability and the fate of chemical compounds in different environmental compartments, chemical speciation and dynamics in coastal environments, and the characterization of natural organic matter and its interaction with contaminants of environmental significance. Armando da Costa Duarte has coordinated over thirty Ph.D./Master students and is currently coordinating the work of several Ph.D. and MSc students in their development of scientific and technological knowledge of excellence on analytical chemistry, qualimetrics and analytical quality assurance. He has either participated or coordinated over seventeen research projects funded by international and national funding agencies. In addition to his ten published books and more than thirty book chapters, Armando da Costa Duarte has over 560 significant peer-reviewed publications. He has also been on the editorial/review panels of reputed international and national scientific journals, and has contributed more than 200 oral/poster communications in scientific meetings. He has received two awards and/or honors. In professional activities he has interacted with 1021 collaborator(s) as co-author of scientific papers. In January 2020 he had an h-index ranging from 53 on SCOPUS to 65 on Google Scholar and total citations ranging from 11987 (SCOPUS) to 16684 (Google Scholar). More details can be found at https://orcid.org/0000-0002-4868-4099 and http://www.cesam.ua.pt/aduarte.

Elena Xoplaki is an expert in Mediterranean climate change research. She has conducted analysis on extremes (heat waves, floods, droughts, etc.), paleoclimatology, climate impacts on societies, climate reconstructions/model comparisons and the influence of circulation on the European and Mediterranean climates. She has participated in and coordinated several European, Swiss and US research projects. From August 2011 she has been awarded an Akademischer Rat position at the Justus-Liebig-University Giessen in Germany. Over the past years, Dr. Xoplaki was strongly involved in the Climate Change and History Research Initiative at Princeton University: “A comparative approach to

climate, environment and society in the Eastern Mediterranean: Towards understanding the impact of climate on complex societies." Her current work also deals with renewable energies and wind power production and climate change for human health aspects. She is also a Steering Committee member of the network of "Mediterranean Experts on Climate and Environ* mental Change (MedECC): Towards an improved scientific assessment of climate change and its impact in the Mediterranean Basin." She has more than seventy peer-reviewed publications and a h-index of 38.

Nabil Khélifi holds a B.Sc. in Natural Sciences and a M.Sc. in Earth & Environmental Sciences from the University of Sfax in Tunisia (2004). He received fellowships from the global change System for Analysis, Research and Training (START) in 2005 and the German Academic Exchange Service (DAAD) from 2006 to 2010 to continue with his Ph.D. studies in Marine Geosciences at the University of Kiel in Germany. After his Ph.D. in 2010, Dr. Khelifi received a postdoctoral research grant from the German Science Foundation (DFG) to start his self-designed research projects at the GEOMAR–Ocean Research Centre in Kiel, Germany on reconstructing past changes in oceanography and climate in the North Atlantic and the Mediterranean Sea using marine sediment samples retrieved by the International Ocean Drilling Program (IODP) and applying foraminiferal and geochemical proxy methods. He published his research work in some reputable journals. Dr. Khelifi also received funding from the European Science Foundation (ESF) and some European universities to co-organize two workshops on Pliocene climate in Bordeaux, France (2009) and Bristol, UK (2013). He also received the Swiss Government Excellence Scholarship (SGES) to continue with his research projects at ETH Zurich, Switzerland in early 2014. However, he decided in March 2014 to pursue his career as a publishing editor with Springer, a part of Springer Nature in Heidelberg, Germany. He is mainly responsible for developing Springer's publishing program in the Middle East & North Africa (MENA). The program currently consists of developing eighteen journals and publishing about

forty scientific books every year. In January 2017 he was promoted to Senior Publishing Editor with Springer. Dr. Khelifi also helps researchers in MENA countries publish their work by delivering educational seminars for authors, reviewers and journal editors to help improve publication output and quality. Dr. Khelifi is also a Visiting Lecturer at the University of Carthage, Tunisia and King Saud University, KSA giving MSc and Ph.D. courses in geo-communication/-presentations and techniques of paper publishing, as well as career development training and professional development/ soft skills workshops. Recently, Dr. Khelifi has been awarded with the 2016 Africa Green Future Leadership Award in recognition of his work contributing to sustainable development through advancing science and promoting publications in Africa and the Middle East.

Gilles Colinet (Belgian, born 1967) is assistant professor at Liege University (Gembloux Agro-Bio Tech). In 1991 he graduated as an engineer in agronomy with a specialization in soil science. His professional career began with a two-year cooperation work in Mali, a few month research at Liege University dedicated to modeling the global carbon cycle, and two years of technical and administrative support on GIS and databases for the Agriculture General Direction of the European Commission.

In 1997 he returned to Gembloux Agro-Bio Tech as a research and teaching assistant under the supervision of Prof. Laurent Bock. The title of his Ph.D. (in French) was: "Metallic trace elements in soils: Contribution to knowledge of the factors of their spatial distribution in the Belgian silt loess" (defense in 2003).

After studying the natural background, he focused his researches into trace elements on the relationships between soil, water and plants—the bioavailability and mobility of elements—and mapping in contaminated environments, among which were the calaminary sites in Belgium and the copper ecosystems in Katanga.

Simultaneously, Gilles Colinet developed research on: (1) risk of contaminations of the food chain in urban gardens, the management and rehabilitation of brownfields and soil remediation; (2) monitoring of soil

quality in croplands and forests in relationship with the quality of the hydrosphere (nitrate, phosphorus, pesticides ...); and (3) the integration of digital soil maps and point databases to build soil reference systems in Southern Belgium.

Gilles Colinet teaches applied soil science at Liege University to bioengineers, geologists and geographs, as well as in specialized Master degrees. He also coordinates a formation about the management of polluted sites in continuing education.

Gilles Colinet has supervised numerous Master theses in Belgium and overseas, seven Ph.D.s—plus seven others at the present time—and twenty or so research projects in Belgium, the Democratic Republic of Congo, Morocco, Burkina Faso, China, the Philippines and Bolivia.

João Miguel Dias holds a Ph.D. in Physics and is Associate Professor with Habilitation in the Department of Physics at the University of Aveiro, where he is the current Director. He founded and leads the Estuarine and Coastal Modeling Division (http://www.nmec.eu/), and is a researcher at the Centre for Environment and Marine Studies) (CESAM), where he is co-coordinator of the Integrated Environmental Systems thematic line. With nearly thirty years of professional experience, he is a specialist in the numerical modeling of physical processes in estuarine and coastal zones. He has participated and coordinated several national and international research projects and has extensive experience in consulting for public and private organizations. He is the editor and reviewer of a large number of international journals, and has integrated project and scholarship evaluation panels in the field of marine science for various national and international agencies. He is the author of over 150 papers in international journals in the areas of environmental sciences and oceanography, and has supervised a significant number of postdoctoral researchers and Ph.D. and M.Sc. students.

Imed Gargouri is an associate professor at the Faculty of Medicine, Sfax University since February 2012. He is the holder of (i) a MD from Sfax University since 1996, (ii) a National Diploma in occupational medicine since September 2000, (iii) a Master's Degree in environmental and health research methods from the University of Grenoble (France) since September 2002, (iv) a Ph.D. in toxicology and occupational health risk assessment from Lille University (France) in 2009. He is also a researcher at the Laboratory of Environmental Engineering and Ecotechnology (National School of Engineering, Sfax University). His research themes deal with (i) chemical risk assessment, (ii) occupational toxicology and (iii) environmental health impacts.

Professor Gargouri has published about twenty-five research papers at the national and international levels, two books and five book chapters mainly in the fields of the environment, chemical risk assessment, occupational toxicology, environmental health impacts and occupational health. He is also a reviewer for several international specialized journals, has chaired several international and national conference sessions and is a member of several scientific committees.

Eric D. Van Hullebusch received his Ph.D. (Aquatic Chemistry and Microbiology) from Université de Limoges (France) in 2002. From November 2002 until October 2004 he was a Marie Curie Postdoctoral fellow at Wageningen University & Research (the Netherlands) where his research focused on the optimization of anaerobic granular sludge reactors by studying the speciation, bioavailability and dosing strategies of trace metals. In 2005, he was appointed as associate professor in biogeochemistry of engineered ecosystems at Université Paris-Est (France). In 2012, Eric D. van Hullebusch obtained his Habilitation qualification in Environmental Sciences from Université Paris-Est (France). The title of his Habilitation thesis is "Biofilms in the environment:

from anaerobic wastewater treatment to material bioweathering". From September 2016 until August 2018, he worked at IHE Delft as chair professor in Environmental Science and Technology and head of the Pollution Prevention and Resource Recovery chair group. In September 2018 he joined Institut de Physique du Globe de Paris (France) as full professor in Biogeochemistry of engineered ecosystems.

Benigno Sánchez Cabrero was born in Iscar (Valladolid), Spain, in 1955. He holds a Ph.D. in Chemistry and a B.Sc. Degree in Biology from the Autonomous University of Madrid. He also has a Diploma in Environmental Engineering, and others in Territorial Zoning and Environment from the University of Valencia.

From 1985, and currently, Dr. Sánchez is a senior researcher at the CIEMAT (Centro de Investigaciones Energéticas Medioambientales y Tecnológicas).

He has been the Head of the Environmental Applications of Solar Radiation to Air Group in the PSA (Plataforma Solar de Almería) from 1990 to 2014. From 2014 he is the Head of Analysis and Photocatalytic Treatment of Pollutants in Air (FOTOAIR) in the Renewable Energy Division of CIEMAT.

Benigno Sánchez Cabrero has thirty-four years of R&D expertise, participated in thirty-seven national and international R&D projects funded by competitive public programs, and has been the head researcher in twenty-three of them. He has been involved in nine R&D contracts with businesses of particular relevance.

He is the co-author of sixty-five scientific-technical publications, and more than one hundred contributions to congresses, courses, seminars and conferences.

He directed seven Ph.D. theses with two more currently underway, plus nineteen Degree projects in Environmental Science and Chemical Engineering at the UAM, URJC, and UCM in Madrid.

He is the first author of a patent and a utility model.

Benigno Sánchez Cabrero has been the national representative to COST 612 (Brussels) and Task Forces related to the effects of air pollution on ecosystems (UN, Geneva).

He is a referee for Applied Catalysis B: Environmental, Building and Environment, and CYTED, COLCIENCIAS, ANPCyT Evaluator among others.

Settimio Ferlisi is Associate Professor of Geotechnics at the University of Salerno (UNISA) in Italy where he currently teaches "Geotechnics" and "Foundations". The results of his scientific activity are testified by numerous publications as well as by his participation in the Center of Excellence on Hydrogeological Risk of UNISA, three projects of relevant national interest (in one case as coordinator of the research unit), and a EU-funded research project. He is on the Board of Professors of the Ph.D. in "Risk and Sustainability in Civil, Architectural and Environmental Engineering Systems" with administrative headquarters at UNISA, a member of the Scientific Committee of the International School on "Landslide Risk Assessment and Mitigation" (LARAM), and head of the Geotechnical Laboratory of the Department of Civil Engineering of UNISA. He is also chief editor of the *Euro-Mediterranean Journal for Environmental Integration* (Springer) and a member of the editorial board of *Geoenvironmental Disasters* (Springer).

Chedly Tizaoui CEng, FIChemE, FHEA is an Associate Professor in Chemical Engineering at the College of Engineering, Swansea University, United Kingdom. He obtained his first degree in Chemical Engineering (six-year path) from the National School of Engineering at Gabes (ENIG), Tunisia, his MSc from INP Toulouse France and his Ph.D. in Chemical Engineering from the University of Bradford UK. Dr. Tizaoui has been the head of the Chemical and Environmental Engineering Portfolio at Swansea University, and he has research interests in Advanced Oxidation Processes (AOPs) and separation technologies to treat water and wastewater. Examples of technologies he is researching include ozone, UV, and nonthermal plasma, membranes, adsorption and bio-flocculation. He develops and employs these technologies to eradicate contaminants of health and environmental significance such as emerging contaminants, pharmaceuticals, oils, landfill leachates, or phosphates and arsenic. Throughout his academic

career, Dr. Tizaoui has devoted himself to research and scholarly activities and has played a significant role in contributing towards various fundamental and applied collaborative research programs. He has supervised to successful completion over twenty Ph.D. and postdoctoral researchers and has published over one hundred papers in peer-reviewed journals and international conferences, as well as authoring technical reports for several organizations. His research into water treatment technologies has been funded by major funding bodies including the UK Engineering and Physical Sciences Research Council; the Royal Society; the Royal Academy of Engineering, and industry. He is associate editor of *Ozone: Science and Engineering*, and the *Euro-Mediterranean Journal for Environmental Integration*and sits on the editorial boards of several peer-reviewed scientific journals, and has also been a reviewer for many international scientific journals and funding bodies around the world. He is member of the International Ozone Association and member of the EU Ph.D. School of Advanced Oxidation Processes.

Amjad Kallel is an Asscociate Professor of Environmental Geology. He holds a B.Eng. in Georesources and Environment (1998) from the University of Sfax (Tunisia), and an MSc degree and a Ph.D. degree in Georesources and Environment (2004) from Hokkaido University (Japan). He joined Venture Business Laboratory (VBL) at Akita University, Japan (2005–2006) as a researcher focusing on refining and recycling technologies for the recovery of rare elements from natural and secondary sources. Back in Tunisia, he worked at the University of Gabes from 2006 to 2011, where he contributed to the elaboration of teaching programs at the Higher Institute of Water Sciences and Technologies of Gabes. Since 2011, he has joined the Sfax National School of Engineering (University of Sfax, Tunisia). There, he has also been involved in various research projects related to environmental geology and environmental geotechnics. Dr. Kallel has organized many prestigious workshops, seminars and international conferences. In 2016, Dr. Kallel joined the *Arabian*

Journal of Geosciences and the *Euro-Mediterranean Journal for Environmental Integration* (Springer) as both a chief editor and managing editor, respectively.

Sami Rtimi is a photo-chemist with a strong background in materials science and microbiology. He was awarded a Ph.D. in Chemistry and Chemical Engineering from the Swiss Federal Institute of Technology–EPFL and a Doctorate in Biological Sciences from the University of Carthage (Tunisia). He is investigating the structure-reactivity relationship of functional/smart materials for environmental (indoor and outdoor) and biomedical applications. With an h-index of 24, he published more than one hundred articles in peer-reviewed journals, patents, several book chapters and presented numerous communications at international meetings. He is editor, guest-editor and regular reviewer for several journals. Sami is an international grants reviewer and Ph.D. programs evaluator. He is also active in some NGOs to promote water and health solutions in Least Developed Countries (LDCs).

Sandeep Panda received his BSc degree with honors in Zoology (2006) from Utkal University, his M.Sc. degree in Biotechnology (2008) from Ravenshaw University and his Ph.D. degree in Life Sciences (2015) from North Orissa University, India. He is currently working as an assistant professor at the Department of Mining Engineering (Mineral–Metal Recovery and Recycling Research Group), Suleyman Demirel University, Turkey. His main research areas include bio-hydrometallurgical and bio-mineral processing for metal extraction from primary and secondary resources, bio-desulphurization, bio and chemical approaches for mine water treatment, and the application of eco-friendly approaches for sustainable mineral-metal waste recycling and management. In 2008, Dr. Panda worked as a research trainee at Bhabha Atomic Research Centre, India, for partial completion of his Masters degree and thereafter joined CSIR–Institute of Minerals and Materials Technology, India in 2009 as a project assistant. In 2012 he was selected as the prestigious CSIR–Senior Research Fellow (direct

scheme) by the Council of Scientific and Industrial Research (CSIR), Government of India. He has been involved (as principal/co-principal investigator and as team member) in many R&D and industrial research projects (at both national and international levels) since 2009. As of 2019, he has published thirty-seven international journal papers, and four book chapters of high quality and impact that have received nearly 650 citations (h-index–15). His research works have invited the attention of several press and media outlets. He is an active member of several prestigious professional bodies and a technical/scientific committee member in a number of reputed International conferences. Dr. Panda has served as a reviewer in over thirty reputed international journals and is currently serving as: (1) associate editor of the *Euro-Mediterranean Journal of Environmental Integration* (Springer Publications); and is an editorial board member of: (2) *Frontiers in Microbiology* (Frontiers Publications); (3) *Frontiers in Earth Science* (Frontiers Publications); (4) *Frontiers in Environmental Science* (Frontiers Publications); and (5) review editor of the section *Microbiological Chemistry and Geomicrobiology* (Frontiers Publications). He has edited two reputed joint-editorial books: (1) *Environmental Microbial Biotechnology* (Springer Publications, Switzerland, 2015); and (2) *Applied & Industrial Biotechnology* (2nd edition, Nirmal Publications, India, 2017). He has also received several prestigious academic awards such as: (1) "The Best Research Scholar Award" by CSIR–Institute of Minerals and Materials Technology, India (2010); (2) "The Best Hindi Essay writing Award on Environment" from CSIR–Institute of Minerals and Materials Technology, India (2010); (3) The prestigious "MISRA Award–The Best Paper Published Award 2012" by the Indian Institute of Mineral Engineers (IIME), India (2013); (4) "TÜBİTAK–2216 International Post Doctoral Scholarship–2015" (Research Fellowship Program for International Researchers) from the Scientific & Technological Research Council of Turkey, 2015–2016; and (5) The prestigious "Young Scientist Award" by Odisha Bigyan Academy (OBA), Odisha, India in 2017.

Philippe Michaud is a Professor of Biochemistry at the head of the Biological Engineering Department of Polytech Clermont Ferrand, a school of engineering of the Clermont Auvergne University (France). A Doctor in Microbiology, Enzymology and Bioconversion, since 2005 he has led a research group entitled "Bioprocesses, Biorefinery, Biopolymers and Biosourced materials" at the Institut Pascal (UMR CNRS 6602) consisting of three associate professors and one technician. His scientific skills center on the development of bioprocesses for obtaining poly- and oligosaccharides from various sources (terrestrial plants, agronomic by-products, macroalgae, microorganisms) and analysis of structure–function relationships. He has published 147 research papers and reviews in international peer-reviewed journals in the field of biotechnology and bioprocesses applied to polysaccharides (h-index 34). Professor Michaud is the inventor or co-inventor of twelve patents, three of them with industrial exploitation. He is the author or co-author of nine book chapters. He has been the advisor or co-advisor for eighteen Ph.D. students. Since 2005, he has been in charge of more than ten national and international research projects, funded or co-funded by industry.

Jaya Narayana Sahu was born in 1976. He received a B.Tech. (Chemical Engineering) from Berhampur University, India and a Ph.D. (Chemical Engineering) from the Indian Institute of technology (IIT) in Kharagpur, India. Dr. Jaya has more than fifteen years of teaching, research, consultancy and projects experience. He is the author/co-author of more than 140 papers (Scopus h-index 40). He is presently working at the University of Stuttgart, Institute of Chemical Technology, Faculty of Chemistry, Stuttgart, Germany under the prestigious Alexander von Humboldt Foundation senior research fellowship. He is the chief editor (Topic 7: Smart technologies for environmentally-friendly energy production) of the *Euro-Mediterranean Journal for Environmental Integration* (Springer).

Mongi Seffen gained a Ph.D. in Applied Chemistry at Poitiers, France (1986), and is a full professor of chemistry since 2002. He has published sixty papers in international refereed journals, six patents in the field of waste oil recovery, waste water treatment by the biosorption process and biofuel production starting from biomass. Professor Seffen is the supervisor of ten Ph.D. theses and twelve graduate theses. He is the local coordinator of two FP7 Projects, SOWAEUMED and FP4BATIW, and several bilateral projects: Tunisian–Moroccan; Tunisian–Egyptian; DGRST; ERASMUS^{+} …….; and is associate editor for the *Euro-Mediterranean Journal for Environmental Integration*. He has organized several workshops and scientific meetings. He is a specialist in: waste water treatment, biomass valorization; biofuels; and waste oil recovery catalysis.

Vincenzo Naddeo is Director of the Sanitary Environmental Engineering Division (SEED) at the Department of Civil Engineering of the University of Salerno (Italy) where he drives research activities in the Environmental Engineering fields. He was a professor in visit at the University of Washington (2009) and Yamaguchi University (2016) as well as a visiting scientist at several foreign research institutions where he collaborated with high-ranking professors. Professor Naddeo is founder and general chair of the international conference series WaterEnergyNEXUS, and coordinator of its International Scientific Advisory Board. Since 2014 Prof. Naddeo holds the Italian National Scientific Qualifications for full professor positions in the academic field 08/A2 (Sanitary and Environmental Engineering).

Professor Naddeo's research focuses on advanced water/wastewater treatment, characterization and control of environmental odours and environmental impact assessment (EIA). He developed advanced biological processes for wastewater treatment and control of emerging contaminants, novel ultrasound-based technological processes for the treatment of environmental matrices (solid, liquid and gaseous) and biotechnologies for wastewater re-use with simultaneous energy production within the circular economy. In addition to

the topics listed above, Professor Naddeo has published works on membrane bioreactors (MBRs), water/wastewater disinfection and disinfection by-products (DBPs), Advanced Oxidation Processes (AOPs), river water quality characterization, remediation of contaminated soil and marine sediments, management and treatment of the organic fraction of solid waste, strategic environmental assessment (SEA) and recently on environmental technologies for the sustainable development of smart cities.

At the Department of Civil Engineering Prof. Naddeo teaches: "wastewater treatment plants", "environmental impact assessment", "energy and environmental sustainability" and "pollution phenomena and control of environmental quality". He is the coordinator of several international and national research projects, a supervisor of Ph.D. students, and a member of the scientific boards of several national and international conferences where he was often invited as plenary or keynote speaker.

He is associate editor of *Water Environmental Research* (Wiley), the *Euro-Mediterranean Journal for Environmental Integration* (Springer) and of the *Earth, Frontiers for Young Minds*. He presently serves on the editorial board of several ISI journals including *Desalination* (Elsevier), *Scientific Reports* (Nature Research), *PeerJ* (Life, Bio, Environment & Health Sciences), *Frontiers in Bioengineering and Biotechnology*, *Water* (MDPI) and *Bioengineered* (Taylor & Francis). Professor Naddeo is also actively involved in a variety of scientific organizations, funding agencies, and European networks.

He holds four patents on water and wastewater treatments by sonolysis and one patent on the novel electronic nose (e.Nose). From 2018 Prof. Naddeo has been CEO and co-founder of Sponge s.r.l., a spin-off of the University of Salerno working in the environmental technology field. He has (co-)authored over 200 refereed publications in ISI journals, congress proceedings and book volumes. He is co-editor of the book *Odour Impact Assessment Handbook* (John Wiley & Sons) as well as editor of several Italian books.